Catalogue of American Amphibians and Reptiles.

Harrison, J.R. 1992. *Desmognathus aeneus.*

Desmognathus aeneus Brown and Bishop
Cherokee Salamander

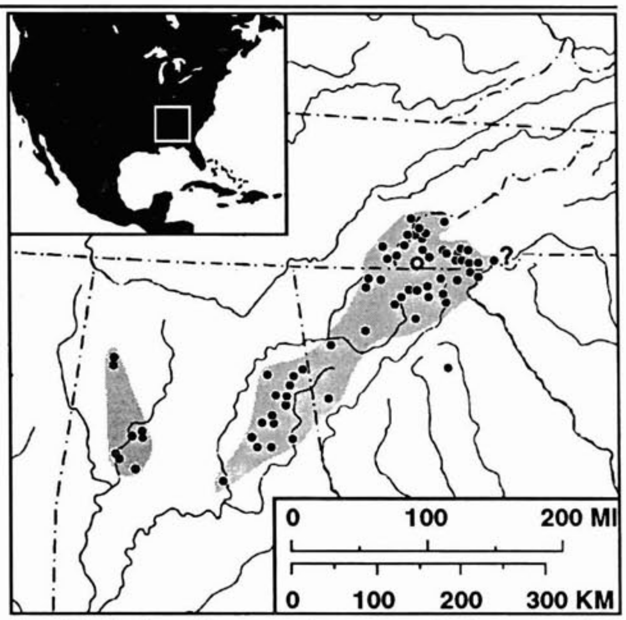
Desmognathus aeneus Brown and Bishop, 1947:163. Type-locality, "...under dead leaves near a small seepage branch 100 feet north of Peachtree Creek, 1/2 mile S.S.E. of Peachtree, Cherokee County, North Carolina." Holotype, U.S. National Museum (USNM) 123977, an adult male (49 mm TL) collected on 22 October 1946 by J.C. Nicholls, Jr. (not examined by author).

Desmognathus chermocki Bishop and Valentine, 1950: 39. Type-locality, "Hurricane Creek, Tuscaloosa County, Alabama, 1 1/8 miles E.N.E. of bridge crossing creek on Alabama State Route 116." Holotype, Chicago Natural History Museum (CNHM) 59232, an adult male (49.5 mm TL), and allotype, CNHM 59233, an adult female (47 mm TL), collected by R.L. Chermock, B.D. Valentine, and J.C. Nicholls, Jr., no date given (not examined by author).

Desmognathus aeneus aeneus: Chermock 1952:29. First use of combination.

Desmognathus aeneus chermocki: Chermock 1952:29. Reduction to subspecies under *D. aeneus.*

Desmognathus aeneus: Mount, 1975:112. Relegation of *D. chermocki* to synonomy with *D. aeneus.*



Map. Distribution of *Desmognathus aeneus.* The large open circle marks the type-locality, solid circles indicate other records. An uncertain record is indicated by a question mark.

• **Content.** No subspecies are recognized currently, but see Nomenclatural History.

• **Definition and Diagnosis.** *Desmognathus aeneus* is a small, slender, round-tailed, terrestrial desmognathine salamander which lacks an aquatic larval stage. Maximum SVL (to anterior margin of vent) is 29 mm in males and 26 mm in females (Harrison, 1963). Both sexes attain sexual maturity at 18-19 mm SVL. The relatively short tail averages 7% (adult males) and 3% (adult females) longer than SVL. Prevomerine teeth are retained in adults and average 7.8 (1-18) in males and 10.9 (4-18) in females. The mental hedonic gland cluster is manifested externally as a transverse, somewhat reniform ridge immediately posterior to the anterior margin of the mandibular symphysis.

The species is distinguished by a dark-bordered, yellowish to reddish-bronze dorsal band which is frequently obscured by uniformly brown or dark brown pigmentation in large males. A middorsal row of chevron-like marks (typically as inverted V's) was present in about 42% of 303 adults examined by Harrison (1963), but most specimens (58%) had a middorsal dark line, a series of dots, or a suffusion of dark pigment. Dorsal bands have regular (80%) or irregular (20%) edges. Dorsal yellowish or reddish spots or blotches may be present on the proximal segments of forelimbs and hindlimbs (23.4%), forelimbs only (1%), hindlimbs only (28.4%), or they may be absent (47.2%). Most adults have dark markings on the head, including a Y-shaped mark posterior to the eyes (91%), an interocular spot (54%), or an occipital spot at the base of the Y-mark (45%). Dorsal surfaces of the head are relatively smooth. Venter is lightly to heavily stippled or mottled with dark pigment. Variation in pattern characters among populations is chaotic and without geographic trends (Harrison, 1963; Folkerts, 1968). Juveniles are similar to adults in color pattern, but are typically brighter in hue.

Twenty-eight hatchlings examined by Harrison (1963) averaged 6-7 mm SVL and had color patterns similar to adults and juveniles. Pale dorsolateral spots were present in 8 of 47 (17%) hatchlings. Gills may be present on hatchlings but are quickly resorbed; an aquatic larval stage is absent. Gills lack true rami and usually bear two slender, unpigmented fimbriae. Fimbriae number 5-9 on each side of the head. The short tail of hatchlings (52-72% of SVL) usually bears a low, but distinct ridge on its distal half. Gill slits and nasolabial grooves are present, labial folds are absent, and



Figure 1. *Desmognathus aeneus* from Graham County, North Carolina. Photograph by R. Wayne Van Devender

eyelids vary from absent to fully developed.

Desmognathus aeneus is similar in size to *D. wrighti* and could be confounded with it, particularly if a mid-dorsal chevron-like pattern is present. However, *D. aeneus* has a pigmented venter, a tail longer than the SVL, relatively short limbs, smooth skin on the dorsum of the head, an occipital spot or blotch in many individuals, and a small, reniform mental hedonic gland cluster. *Desmognathus wrighti* has an unpigmented venter, a tail shorter than SVL, longer limbs, rugose skin on the head, no occipital spot (usually), and a large "V" or "U"-shaped mental hedonic gland cluster in males; *D. wrighti* also often has gold chromatophores in the pericardium and silvery flecking along the sides.

• **Descriptions.** Brown and Bishop (1947) described the type-series of *Desmognathus aeneus* and compared the species with *D. wrighti* and *D. ochrophaeus.* Bishop and Valentine (1950) described the type series of *D. chermocki* and compared it with *D. aeneus* and *D. ochrophaeus.* Martof and Humphries (1955) gave measurements for a series of specimens from Georgia. Harrison (1963) described and discussed variation in body proportions, patterns, egg production, osteology, dentition, and other structural features in *D. a. aeneus* and *D. a. chermocki* and compared them with *D. wrighti.* Folkerts (1968) provided descriptions of adults, juveniles, and recently hatched young as well as an analysis of variation in morphometric chracteristics, color patterns, and other structural features in Alabama specimens. Rubenstein (1969) studied body proportions, prevomerine teeth, and color pattern in two Alabama populations. Folkerts (1971) commented on ecotypic variation in the species. Wake (1966) described osteological features. Brief descriptions of adults were provided by Chermock (1952), Conant (1958, 1975), Blair (1968), Cochran and Goin (1970), Leviton (1971), Mount (1975), Smith (1978), Behler and King (1979), Martof et al. (1980), Ballinger and Lynch (1983), and Conant and Collins (1991).

Brown and Bishop (1947, 1948), Bishop and Valentine (1950), Harrison (1963, 1967), and Folkerts (1968) described ovarian and/or recently deposited eggs. Wortham et al. (1977) described spermatozoa. Recently hatched young were described and/or figured by Valentine (1963), Harrison (1967), and Folkerts (1968). Freytag (1974) also provided a brief description of hatchlings.

Keys including this species (adults or recently hatched young) were given by Chermock (1952), Martof (1956), Blair (1968), Folkerts (1968), Whitaker (1968), Ballinger and Lynch (1983), and Altig and Ireland (1984). The keys in Blair (1968), Whitaker (1968), and Ballinger and Lynch (1983) failed to identify some specimens of *D. aeneus* correctly as they were assumed, in error, to lack chevron-like marks.

• **Illustrations.** Smith (1968) provided two color drawings of adults, and Martof et al. (1980) presented a color photograph of an adult. B&W photographs have been published of an egg-guarding female (Tilley, 1973), an adult (Mount, 1975), hatchlings (Valentine, 1963), and a courting pair (Promislow, 1987). Line drawings of adults, the skull, hyobranchial apparatus, and limbs appeared in Brown and Bishop (1947) and Bishop and Valentine (1950). Brown and Bishop (1947) also included line drawings of the atlas, whereas Brown and Bishop (1948) and Bishop and Valentine (1950) illustrated newly deposited eggs. Harrison (1967) illustrated recently hatched juveniles. Conant (1958, 1975) and Conant and Collins (1991) had line drawings of adults and the latter two included line drawings of mental hedonic gland clusters. Means (1974) provided a line drawing of the head and a B&W photograph of dentary teeth. The color photograph presented in Behler and King (1979) is a misidentified *D. wrighti.*

• **Distribution.** *Desmognathus aeneus* is represented by relatively isolated, local populations in hardwood forests of southwestern North Carolina, eastern Tennessee, northern Georgia, and north-central Alabama. In Alabama an apparent hiatus exists between western populations in the Fall Line Hills region and eastern populations in the Blue Ridge and adjacent Piedmont regions. An apparently disjunct population is present in the Piedmont of northeastern Georgia.

Localities were summarized by Harrison (1963, 1967), Mount and Folkerts (1968), Folkerts (1968), and Mount (1975), who also provided a spot distribution map for Alabama. Records from Georgia were reported by Neill (1954, 1957), Martof and Humphries (1955), Martof and Rose (1963), and Wharton and Howard (1971). Martof and Rose (1963) reported specimens from Transylvania and Cherokee counties in North Carolina, but the Transylvania County record was based on a misidentified *D. wrighti* (Harrison, 1967). Jones (1981) gave locality data and a spot map for Tennessee specimens.

Tilley and Harrison (1969) and Rubin (1971) reported sympatry between *Desmognathus aeneus* and *D. wrighti* at two locations in Macon County, North Carolina. Bruce (1991) also found these two species in close proximity in forest floor habitats at elevations of 1000-1100 m along the Nantahala River in North Carolina. General statements and/or range maps were provided by Leviton (1971), Freytag (1974), Smith (1978), Martof et al. (1980), Frost (1985), and Conant and Collins (1991).

Harrison (1967) speculated that the Little Tennessee and Chatooga rivers are bariers to dispersal of *Desmognathus aeneus.* Even though Huheey (1966) and Huheey and Stupka (1967) did not find the species in Great Smoky Mountains National Park, it does occur at the southern end of the park in Swain County, North Carolina, just east of the Little Tennessee River (Richard Highton, pers. comm.). Jones (1981) was unsuccessful in locating populations in Tennessee north of the Little Tennessee River. A specimen was observed, photographed, and released in Jackson County, North Carolina just east of the Chatooga River by Larry Wilson (*fide* Richard Bruce, pers. comm.).

Desmognathus aeneus is a terrestrial forest species (Harrison, 1963, 1967; Folkerts, 1968; Hairston, 1973, 1980, 1986, 1987; Jones, 1981; and Bruce, 1991). Individuals are usually found under leaf litter or surface debris in mixed hardwood forests near seepages, bogs, or small streams. Elevations of known populations range from 30-60 m in Alabama to 1340 m just south of Stratton Gap in the Unicoi Mountains of North Carolina (Harrison, 1967; Bruce, 1991; R.W. Van Devender, pers. comm.). *Desmognathus aeneus* is not known to climb on vegetation above the forest floor and, when active, characteristically remains hidden beneath leaf litter (Harrison 1967; Folkerts, 1968; Hairston, 1987; and Jones, 1981). One possible exception, Wilson's (1984) anecdotal account of scansorial behavior in *D. chermocki* (sic), merits further investigation. Brandon and Huheey (1975) noted the absence of diurnal activity in this species and *D. wrighti.*

• **Fossil Record.** None.

• **Pertinent Literature.** Brown and Bishop (1947, 1948) described ovarian and recently deposited eggs. Nicholls (1950) mentioned *Desmognathus aeneus* as a possible associate of *D. ocoee,* and Sever et al. (1976) mentioned the species as an associate of *Eurycea junaluska.* Valentine (1950) provided data on habitat, associated species, eggs, and egg guarding. Martof and Humphries (1955) described habitat. Martof (1962) commented on terrestriality and oviposition sites. Valentine (1963) described development of color pattern, incubation period, hatching, hatchling morphology, size at hatching and metamorphosis, and hatchling behavior. Harrison (1963) analyzed geographic variation in morphometric and other characteristics in *D. a. aeneus* and *D. a. chermocki* and compared them with *D. wrighti.* Harrison (1967) provided data concerning distribution, habitat preference, oviposition period, egg morphology and development, hatchling form and behavior, and population structure and growth. Folkerts (1968) described adults, juveniles, and hatchlings and provided data on their habitat, associated species, abundance, food habits, oviposition and eggs, hatchling behavior, and growth and maturity. Donovan and Folkerts (1972) summarized dietary information. Hairston (1973, 1980, 1986, 1987) included *D. aeneus* in his studies of interspecific relationships of desmognathine salamanders in relation to abundance, microhabitat segregation, competition, and predation. Wortham et al. (1977) described spermatozoa. Jones (1981) reported on distribution, habitat, diet, and reproduction in Tennessee specimens. Promislow (1987) compared courtship behavior in *D. aeneus* with that of *D. wrighti.*

Brodie (1977) included *D. aeneus* in his study of salamander antipredator postures. Dodd (1990) provided information on temperature and body size effects on duration of immobility. Marks and Collazo (1988) and Collazo and Marks (1989) summarized several aspects of embryonic development. Sever (1976) described external morphology of the mental hedonic gland cluster. Sever (1983), Sever and Trauth (1990), and Sever et al. (1990) described cloacal anatomy, including the absence of dorsal glands in this species.

Sweet (1973, 1980) included *D. aeneus* in his examination of allometry, life history, and evolution in desmognathine salamanders. Rubenstein (1971) suggested that cranial osteology provided no evidence for paedomorphism in this species or in *D. wrighti.* Hinderstein (1969, 1971a, 1971b) placed (provisionally) *D. aeneus*

and *D. wrighti* in a species group based on electrophoresis and included them in studies of desmognathine head musculature and jaw apparatus. Tilley (1969) suggested that *D. aeneus* is a possible exception to the presence of paired, lateral light spots in young desmognathines (see, however, Valentine, 1963, and Harrison, 1967). Wake et al. (1987) commented on the presence of a much reduced lateral line system in the species. Nishikawa et al. (1987) noted a well-differentiated spinal column with spindle-shaped motor neurons.

• **Nomenclatural History.** *Desmognathus aeneus* Brown and Bishop and *D. chermocki* Bishop and Valentine are currently considered conspecific; however, no data supporting this allocation have been published. On the basis of small size, retention of prevomerine teeth, costal groove count, and general appearance, Bishop and Valentine (1950) stated that *D. chermocki* was apparently related to *D. aeneus*. Neill (1950) suggested that *D. aeneus* had close affinities with *D. wrighti* and that the two were probably subspecifically related. Neill (1950) did not present data suporting his conclusion or actually use *aeneus* as a subspecies of *D. wrighti*. Chermock (1952) treated *D. chermocki* as a subspecies of *D. aeneus*, presumably on the basis of the similarities noted by Bishop and Valentine (1950), as he presented no supporting evidence. Neill (1954) concurred with this arrangement without additional evidence. The two taxa were variously treated as species or subspecies until Mount (1975) relegated *D. chermocki* to the synonomy of *D. aeneus* based on his examination of material available, mostly from Alabama. Mount (1975) did not provide evidence to support his arrangement, but he probably was influenced by data provided by Folkerts (1968).

Harrison (1963) analyzed variation in various morphometric, pattern, and osteological characteristics and provided evidence supporting conspecificity of *D. aeneus* and *D. chermocki*. His analysis confirmed that *D. wrighti* was distinct from *D. aeneus* and was not closely related to it. Folkerts (1968) studied morphometric, ontogenetic, and geographic variation in Alabama populations and concluded that evidence did not support recognition of *D. aeneus chermocki* as a valid subspecies.

• **Remarks.** *Desmognathus aeneus* has been listed in various catalogs and checklists, including those of Neill (1949), Schmidt (1953), DePoe et al. (1961), Brame (1967), Gorham (1974), Dowling (1974), Frost (1985), and Banks et al. (1987). The species has been referred to by various common names including "Least Dusky Salamander" (Neill, 1949), "Bronzed Pigmy Salamander" or "Chermock's Pigmy Salamander" (Martof, 1956), "Cherokee Salamander" or "Alabama Salamander" (Anon., 1956; Conant, 1958), and "Seepage Salamander" (Conant and Collins, 1991). The name "Seepage Salamander" was used by Conant (1975), Collins et al. (1978), Collins (1990), and Conant and Collins (1991), whereas Martof ét al. (1980) preferred "Cherokee Salamander." The name "Cherokee Salamander" probably is the better appellation, as *D. aeneus* is not restricted to seepages and is primarily a forest species. In addition, the range is contained within the area historically occupied by the Cherokee Indian Nation.

Bowler (1977) reported a minimum survival in captivity of 4 years and 14 days for a wild-caught specimen in the Cincinnati Zoo. A SSAR subcommittee (Anon., 1989) assigned a value of $0.35 per specimen of *Desmognathus aeneus*. Folkerts (1968) presented evidence that logging activities were responsible for extirpation of some Alabama populations.

• **Etymology.** The name *aeneus* (Latin) means "bronzy," in allusion to the typical coloration of the dorsal band. The name *chermocki* honors Ralph L. Chermock, a former director of the University of Alabama's Museum of Natural History.

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Julian R. Harrison, The College of Charleston, Charleston, SC 29424.

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